Revision 1.0

SEMINIX

User's Manual

AS-pro2
On-board Programmer

DECEMBER   2011

AS-pro2 (On-board Programmer)

Important Notice

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"Typical" parameters can and do vary in different applications. All operating parameters, including "Typical" must be validated for each customer application by the customer's technical experts.

Table of Contents

1. General description and Features

1.1 Main features

AS-pro2 is a high-speed programmer for the Samsung serial MTP including Cortex-M series (Flash memory MCU) devices on board and developed as small size for portability. It can program a new firmware code into Samsung MTP MCU mount on PCB when you need to upgrade the system firmware code for A/S (After Service) without a host PC. So it is very useful to upgrade the firmware code of Samsung MCU built in the Air-conditioner, Refrigerator, Washing machine like a heavy goods which are difficult to move them to the After Service center.

Main features are as follows:

- Portable & Stand alone Samsung OTP/MTP/FLASH MCU programmer.
- Supports all Samsung OTP and MTP devices with Samsung standard serial protocol format.
- Hex data file downloads via USB port form PC.
- Main functions
  - Chip Erase (MTP or FLASH MCU)
  - Program (Writing data into device)
  - Verify data with the data in buffer memory of AS-pro2
  - Getting checksum of the Buffer data
  - Device checksum

- Very fast program and verify time
  - 2K byte (OTP type MCU) or 10K byte (MTP or FLASH MCU) per 1 second.
- Small size for the portable use. (Width : 46, Length : 82, Depth : 16 mm, weight : 50g)
- Internal buffer memory : 118M Byte
  - Can download several hex files and select one file when programming it to MTP built in application system.
- Power supply   :   External power adapter operation
  - Power adapter (100~220VAC to 15VDC, 500mA)
  - Maximum supply current to Application system: 300mA

- Driver software is run under Windows 98/2000NT/XT
  - User can easily select device type or configuration settings
  - Key-based menu-drive software for simple operation.
- System upgradeable
  - AS-pro2 system firmware can be upgraded at need.

1.2 Packing Includes

  1) AS-pro2 main body
  2) USB Cable
  3) 20pin Connection Cable
  4) 20 to 9 pin Adapter Board (AB-20P9)
  5) Power Adapter (15VDC)
  6) User's Manual
  7) USB drive files for Win98.

AB-20P9   Connection Cable

AS-pro2 Main Body   Power Adapter   USB Cable

Figure 1.   AS-pro2 unit kit

2. Getting Started

2.1 Device support

AS-pro2 supports all of Samsung OTP, MTP and FLASH MCU with Samsung standard serial protocol format.

2.2 To install AS-pro2 USB driver

Window ME/2000/XP or later version
The USB driver will be installed automatically (No need of installation manually).
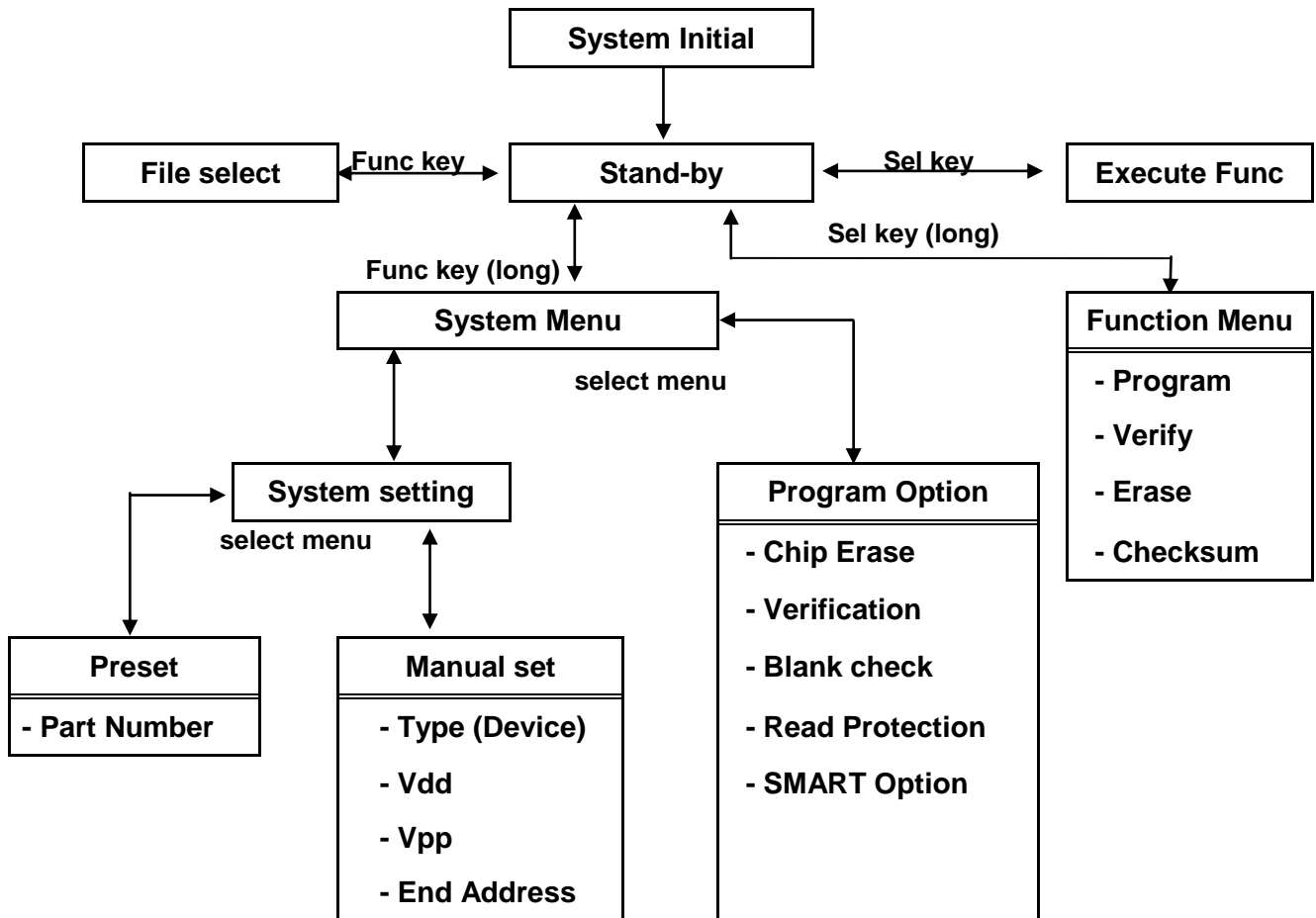
2.3 Hardware Setup (On-board programming)

1) Supply electric power to External power adapter.

2) Connect AS-pro2 to the Application System with connection cable.

3) AS-pro2 is activated and LCD screen displays basic mode.
   (AS-pro2 main body doesn't have the power source for itself)

Figure 2.   Hardware configuration
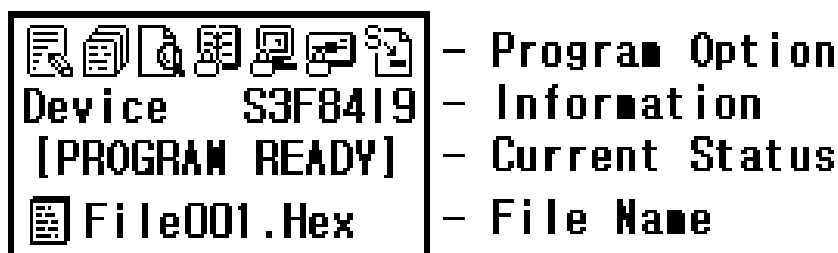
3. Operation descriptions

3.1 System function-map

```
                              ┌──────────────────┐
                              │  System Initial  │
                              └──────────────────┘
                                        │
                                        ▼
┌──────────────┐   Func key   ┌──────────────────┐    Sel key    ┌──────────────┐
│ File select  │◄───────────► │     Stand-by     │◄────────────► │ Execute Func │
└──────────────┘              └──────────────────┘               └──────────────┘
                                  │        ▲
                                  │        │  Sel key (long)
             Func key (long)      ▼        │
                              ┌──────────────────┐              ┌──────────────────┐
                              │   System Menu    │◄─────────────│  Function Menu   │
                              └──────────────────┘              ├──────────────────┤
                                  │        ▲    select menu     │  - Program       │
                                  │        │                    │  - Verify        │
                                  ▼        │                    │  - Erase         │
                          ┌──────────────────┐                  │  - Checksum      │
                   ┌─────►│  System setting  │                  └──────────────────┘
                   │      └──────────────────┘
                   │   select menu   │    ▲
                   │                 ▼    │
┌──────────────────┐          ┌──────────────────┐    ┌──────────────────┐
│     Preset       │          │    Manual set    │    │  Program Option  │
├──────────────────┤          ├──────────────────┤    ├──────────────────┤
│ - Part Number    │          │  - Type (Device) │    │  - Chip Erase    │
└──────────────────┘          │  - Vdd           │    │  - Verification  │
                              │  - Vpp           │    │  - Blank check   │
                              │  - End Address   │    │  - Read Protection│
                              └──────────────────┘    │  - SMART Option  │
                                                      └──────────────────┘
```

* Key Function
- UP   : 'Func' key
- Down : 'Sel' key
- Select : 'Sel' key with long time (over 1 sec)

3.2 Stand-by Mode


```
[icons] - Program Option
Device   S3F8419  - Information
[PROGRAM READY]  - Current Status
▤ File001.Hex  - File Name
```

Stand-by Mode

(1) Program Option
   - ▤ : Auto Chip Erase
   - ▤ : Auto Verify
   - ▤ : Auto Blank Check
   - ▤ : Auto Read Protection
   - ▤ : SMART Option

(2) Information
   - Device : product part number
   - Setting Voltage : Device operating voltage (Vdd), Programming voltage (Vpp)
   - End Address : length of hex file
   - Buffer Checksum : 2 bytes of checksum of data in buffer

(3) Current Status (of AS-pro2 system operation)
   - Program
   - Verify
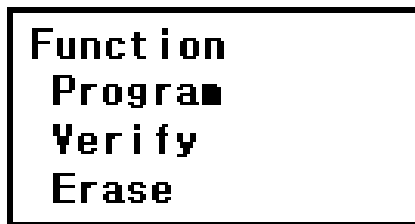   - Erase
   - Checksum

(4) File Name
   - File Name should be set in English or Arabic number.

3.3 Execute
   - 'Current Function' is started by pressing 'Sel' key at Stand-by mode.
   - The result and status will be displayed on LCD window.

3.4 Function Menu
- Choose a function which you want among 'Program', 'Verify', 'Chip Erase', and 'Check sum'.

```
Function
 Program■
 Verify
 Erase
```

1) Press 'Sel' key *for a little long time* in 'Stand-by' mode to go to the main menu
2) Moving the cursor is available by using 'Sel' key or 'Func' key.
3) If you press 'Sel' key for a little long time, an item with the cursor is selected and then
   the mode is back to 'Stand-by' mode

3.5 File select
- In this mode, you can choose a file to be programmed.
   *Only support files with 'Intel hex format or Samsung hex format'

```
📂ROOT                    ➞ Folder Name
 📁Folder
 📄File001.Hex            }─ Contents
 📄File002.Hex
```
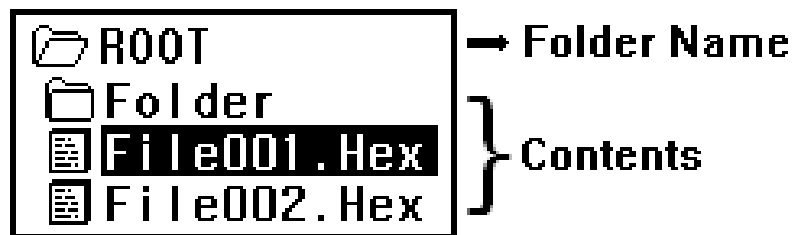
Display window – File Select Mode

1) Press 'Func' key at 'Stand-by' mode to go to 'File Select' mode.
2) Moving the cursor is available using 'Sel' key or 'Func' key.
3) If you press 'Sel' key for a little long time, an item with the cursor is selected and then
    the mode is back to 'Stand-by' mode
4) Press 'Func' key longer, if you want to go to the upper (parent) folder.
   When you are in a root folder, It can enter the Stand-by mode to press "Func" key longer.

3.6 System Menu

```
Menu
 System Setting
 Program Option
 Exit
```
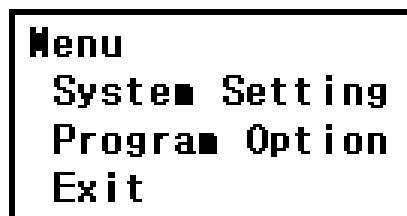
1) Press 'Func' key *for a little long time* in 'Stand-by' mode to go to the main menu
2) Moving the cursor is available using 'Sel' key or 'Func' key
3) If you press 'Sel' key for a little long time, the item with the cursor will be selected

3.7 System Setting

```
System setting
 Preset
 Manual set
 Return
```

- System setting menu is to select 'Device Type', 'Vdd', 'Vpp', and 'End Address' for the programming devices properly.
- There are two ways to do 'System setting'. One is 'Preset' and the other is ' Manual set' mode

1) Preset mode
   If you select the device name (part number) on LCD window, 'Device Type', 'Vdd', 'Vpp' and 'End Address' of the selected device are set automatically by the device define file (ddf) information.

```
Device Name
 S3F84H5
 S3F8418
 S3F8419
```

- Moving the cursor is available using 'Sel' key or 'Func' key
- If you press 'Sel' key for a little long time, the item with the cursor is selected

2) Manual setting mode
   User should set 'Device Type', 'Vdd', 'Vpp', and 'End Address' manually.

```
Manual Set
Type   =    MTP
Vdd    =   5.0[V]
Vpp    =   5.0[V]
```

- Moving the cursor is available using 'Sel' key or 'Func' key
- If you press 'Sel' key for a little long time, the item with the cursor is selected
- The value of the selected item can be changed.

A) Setting
   - Moving the cursor or changing value is available using 'Sel' key or 'Func' key
   - If you press 'Sel' key for a little long time, the current value is selected

   a) Device Type

```
┌─────────────────────────┐
│ Type Set                │
│     Device Type         │
│                         │
│  [ OTP ]     MTP        │
│                         │
└─────────────────────────┘
```

   b) System voltage

```
┌─────────────────────────┐
│ Vdd Set                 │
│   System Voltage        │
│                         │
│   <  3.3 [V]  >         │
│                         │
└─────────────────────────┘
```

   c) Program voltage

```
┌─────────────────────────┐
│ Vpp Set                 │
│   Program Voltage       │
│                         │
│   <  12.5[V]  >         │
│                         │
└─────────────────────────┘
```

   d) End Address

```
┌─────────────────────────┐
│ Address Set             │
│    End Address          │
│                         │
│   <   64 KB  >          │
│                         │
└─────────────────────────┘
```
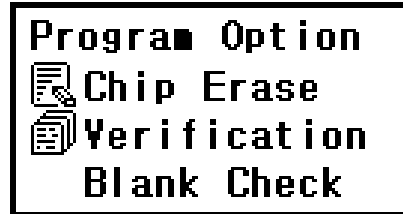
3.8 Program Option

This menu is to choose the programming options such as Chip Erase, Verification, Blank check, Read Protection, LDC Protection, Hard Lock, and SMART Option.
(Example)
If users choose the Read Protection, the read protection will be done automatically after programming.

```
┌──────────────────────┐
│ Program Option       │
│ ▒ Chip Erase         │
│ ▤ Verification       │
│   Blank Check        │
└──────────────────────┘
```

1) Moving the cursor is available using 'Sel' key or 'Func' key
2) If you press 'Sel' key for a little long time, the item with the cursor is selected
3) Selection and cancellation will be toggled whenever you press 'Sel' key at the same item.
4) The icons are come out on the left side of the selected items, and there is no icon if you cancel item of the program options.

3.9 File Download (Hex data files)

1) Connect the AS-pro2 to the USB port of the PC using the USB cable.
2) Copy a file to removable disk.
3) Disconnect the USB connection.

   * *File name should be made in English.*
   * *Remove 'Adapter power' or turn off 'Application System Power' when AS-pro2 connects PC via the USB cable.*

3.10 System Upgrade

1) Download the upgraded file from website (http://www.seminix.com).
2) Copy the upgraded file to AS-pro2 and then disconnect USB cable after copying.
3) Connect the USB cable again (AS-pro2 and PC) for upgrading sequence.
4) AS-pro2 will be connected to PC after finishing the system upgrade successfully.

   * *Please backup the hex data in the buffer of AS-pro2 before the upgrade because the buffer data will be formatted after finishing the upgrade*

   * *All setup data ('Device Type' ,'Vdd', 'Vpp', and 'End Address') of the system setting are initialized after the upgrade.*

## 3.11 AS-pro2 Operating Sequence
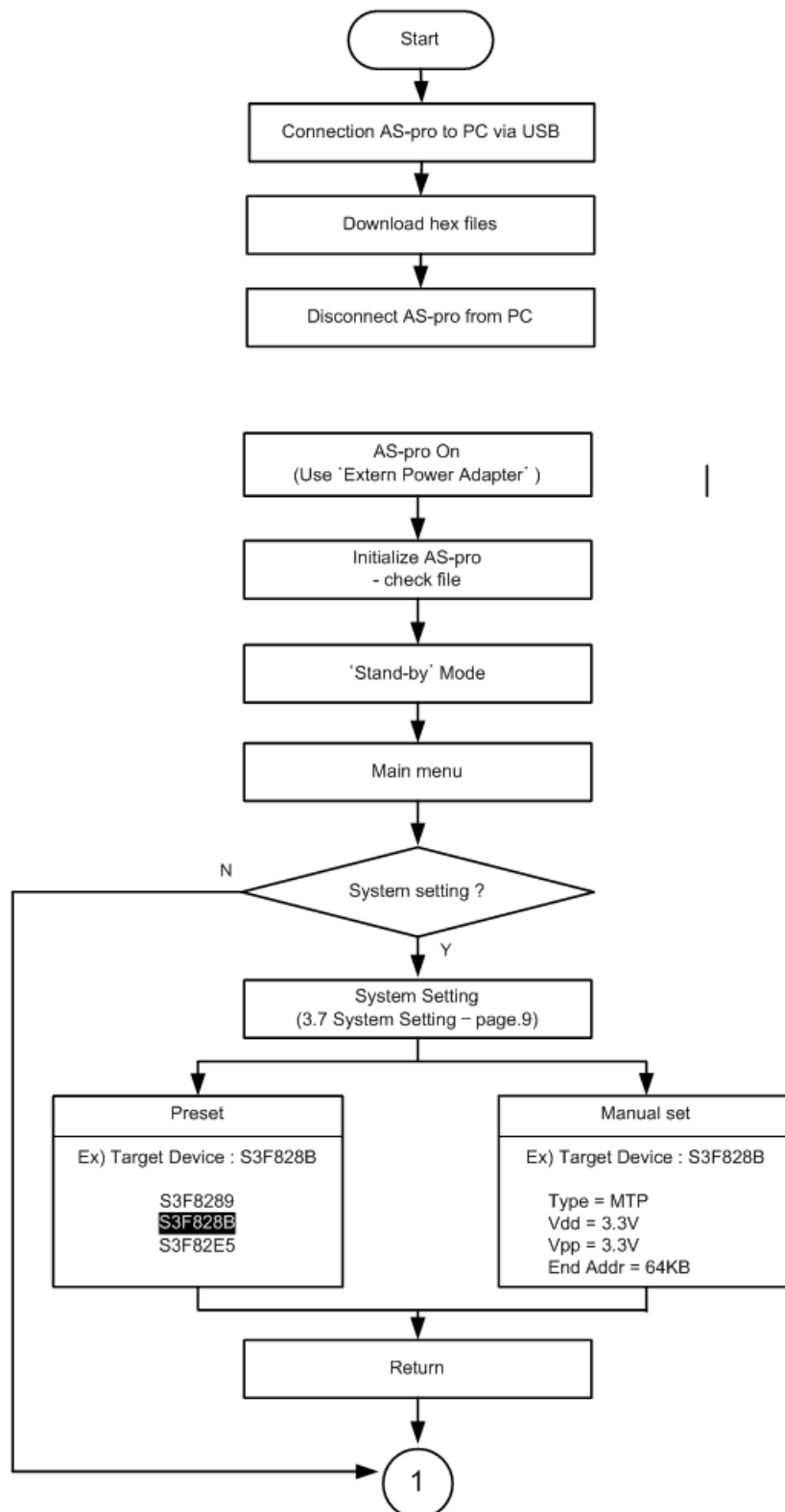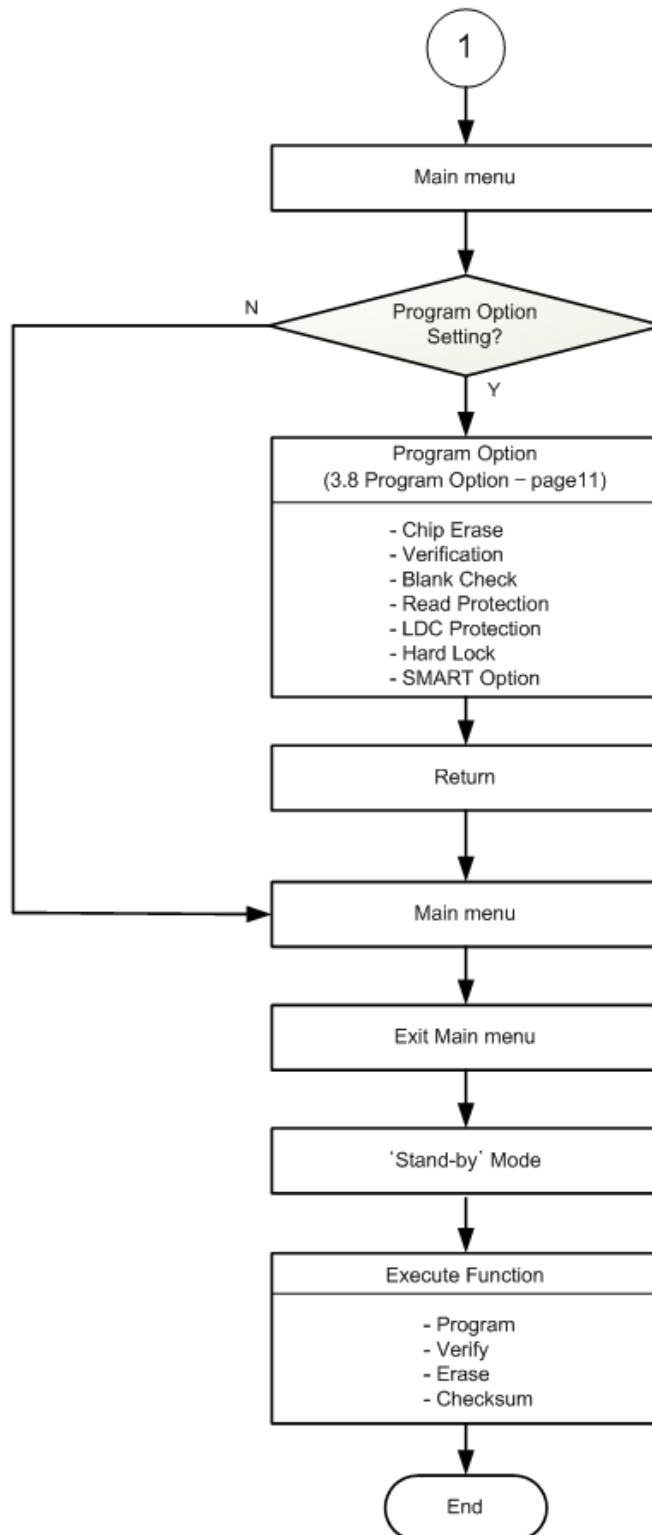
4. Electrical Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Current Consumption (Vdd : 5V)	Stand by	-	-40	-85	mA
	Operating	-100	-	-200	
Programming Voltage (Vpp)	Ipp=10mA	3.3	-	12.5	V
Programming Current (Ipp)	Vpp=12.5V	5	10	-	mA

5. Pin Description (20-pin side, JP1 of AB-20P9)

1	3	5	7	9	11	13	15	17	19
2	4	6	8	10	12	14	16	18	20

Pin No.	Name	Description	Pin No.	Name	Description
1	SCLK	Serial Clock	2	GND	GND
3	SCLK	Serial Clock	4	GND	GND
5	VPP	Program Voltage	6	MODE0	Test Mode 0
7	VPP	Program Voltage	8	GND	GND
9	RST	Reset	10	MODE1	Test Mode 1
11	RST	Reset	12	MODE2	Test Mode 2
13	VDD	External Operating Voltage	14	-	-
15	VDD	External Operating Voltage	16	GND	GND
17	SDAT	Serial Data	18	GND	GND
19	SDAT	Serial Data	20	GND	GND

6. Pin Description of AB-20P9 (9-Pin side)
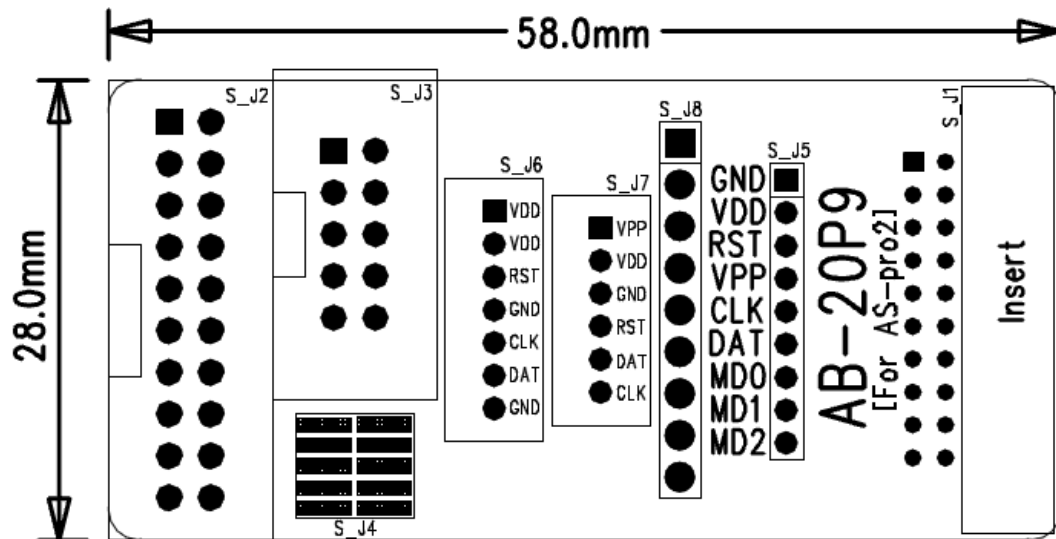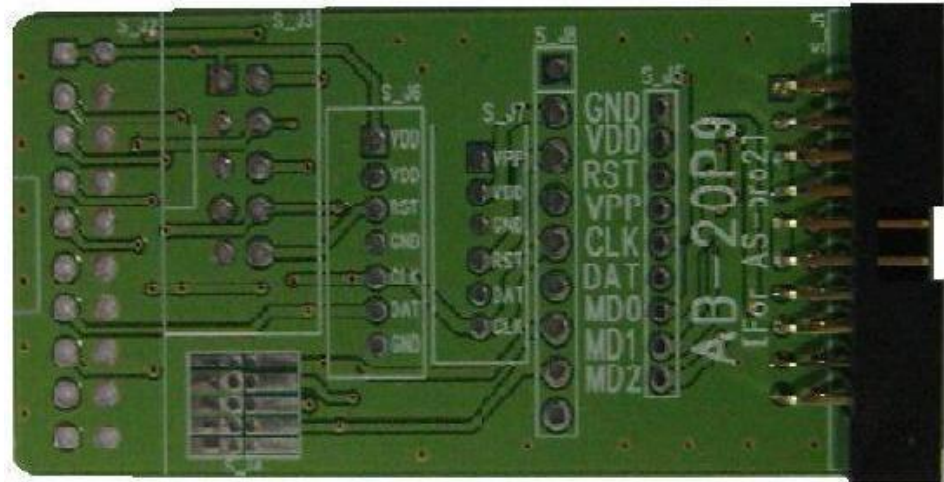
Connector Name	Description
S_J2	For JTAG – 20pin 2.54mm pitch
S_J3	For JTAG – 10pin 2.54mm pitch
S_J4	For JTAG – 10pin 1.27mm pitch
S_J5	For Serial Program – 9pin 2.54mm pitch
S_J8	For Serial Program – 9pin 2.00mm pitch
S_J6	For Samsung Electronics Co.,Ltd., – 7pin 2.00mm pitch
S_J7	For Samsung Electronics Co.,Ltd., – 6pin 2.00mm pitch

Pin Name	Description	Core
GND	GND	SAM8 CalmRISC ARM 8051
VDD	External Operating Voltage	
RST	Reset	
VPP	Program Voltage	
CLK	Serial Clock	
DAT	Serial Data	
MD0	Mode 0	Cortex
MD1	Mode 1	
MD2	Mode 2	

7. On-board writing application – Samsung MCU

At the Samsung MCU writing, the AS-pro2 needs only 9 signal lines that are VDD, GND, TEST, MODE0, MODE1, MODE2, RESET, SCLK, and SDAT of MCUs.
When you design the PCB circuits, you should consider the usage of these lines for the on-board writing (In-system programming).

In case of TEST(MODE) pin, normally test pin is connected to GND but in writing mode, the programming voltage (Vpp) power signal is input to this pin. Therefore, combining these two cases, a resistor should be inserted between the TEST(MODE) pin and GND. The Reset, SDAT and SCLK should be treated under the same consideration.
Please be careful to design the related circuit of these signal pins because rising, falling timing of VPP, SCLK and SDAT are very important for proper programming.

Reference Table for connection

Pin name (MCU side)	I/O mode in Applications	Resistor (need)	Recommend Value
Vpp(TEST or Mode)	Input	Yes	R$_{TEST}$ is 47 kΩ C$_{VPP}$ is 104pF
RESET	Input	Yes	R$_{RESET}$ is 47 kΩ
SDAT(I/O)	Input	Yes	R$_{SDAT}$ is 4.7 kΩ
	Output	No (Note 1)	
SCLK(I/O)	Input	Yes	R$_{SCLK}$ is 4.7 kΩ
	Output	No (Note 1)	

Notice
1) In te on-board writing mode, very high-speed signal will be provided to SCLK and SDAT pin. And it will cause some damages to the application circuits which are connected to SCLK or SDAT port if the application circuit is designed as the high-speed response such as relay control circuit.
2) 1.5m of cable is the maximum length from AS-pro2 to a target chip
3) Power supply - Use 'External Power Adapter (15VDC)' for program to chip.
4) if 'Reset pin' and 'Vpp(Test) pin' are same, you have only to connect Vpp(Test) pin.
5) Please check Vdd, Vpp, and Checksum before programming.
6) Please check the connection line are correct(Vdd, Vpp(TEST or MODE), GND, RST, SCLK, SDAT).
7) if there is no problem of Vdd, Vpp, checksum and programming fail continuously, please try to contact SEMINIX as soon as possible.

If user doesn't follow this notice and keep using AS-pro2 even though there seem to be a problem of AS-pro2 , SEMINIX will disclaim all responsibility.
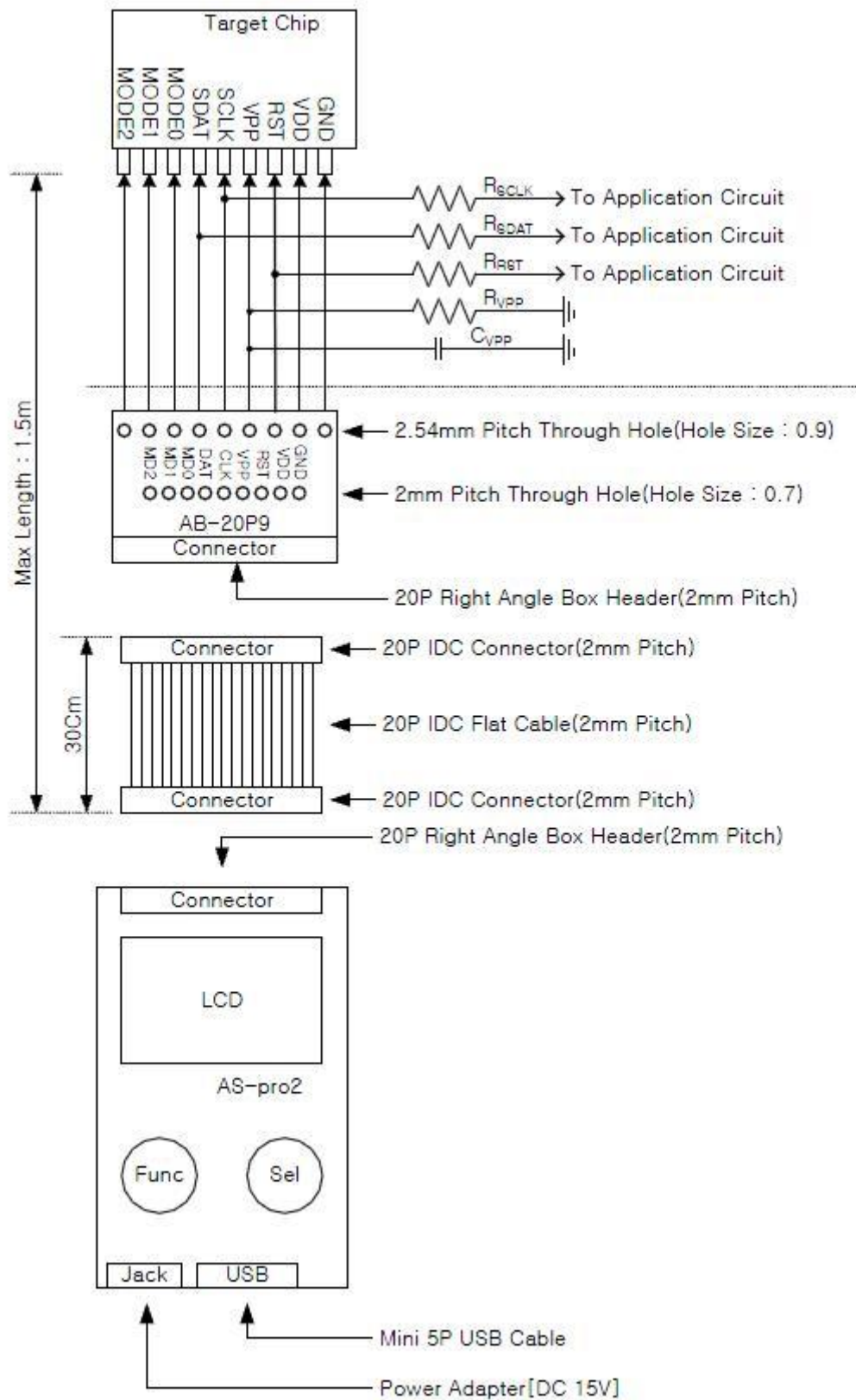
Application circuit for On-board writing

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